

Another common species, D. pallida, grows in similar areas, but favors a situation where it can cling to supporting shrubs which also provide shade, and hence, cool soil for the dormant tuber in summer. Growing up to five feet tall, this "rainbow" is conspicuous along many road verges, particularly when the sun follows rain. Favoring slightly damper areas is D. glanduligera which grows in a diversity of soils such as clay, gravelly loam, on the edges of peat swamps and areas of seepage. D. bulbosa is more selective in its habitat, growing in wet sandy flats in an open situation with D. sunhirtella and Utricularia menziesii. The area with which I am familiar supports very little other vegetation--a few stunted melaleucas and sparse rush-type growth, so the lack of shelter from other plants must result in high ground temperatures during the summer resting period.

Looking like a host of miniature Father Christmases, Utricularia menziesii is a small gem which grows in mossy cushions on granite rocks, or wet sandy flats. The situation in which these plants grow assure them of the benefit of any rain which falls; but the very exposed habitat, particularly in the shallow depressions on granite, must subject the dormant plant to a baking during summer, a fact which would probably have to be considered in cultivation.

Utricularia volubilis sends up a flowering scape which twines around the rushes in peaty, swamp areas. Cephalotus which grows nearby favors tussocks where its head is out of water, but U. volubilis prefers to stand in shallow water or very wet situations.

The two species of Polypompholyx--P. tenella and P. multifida--inhabit areas of seepage on hillsides, the latter forming a carpet of color in some areas. P. multifida also likes damp peaty areas, among shrubs such as Callistemon speciosus and Leptospermum firmium.

NEPENTHES CHASING IN SINGAPORE by Bill Hanna

Before going on holidays I had been busily writing to various people, universities and botanic gardens in the places I was going with the hope of finding someone with an interest in, or who grows carnivorous plants, particularly Nepenthes. The only success I had was in Singapore--with the Botanic Gardens, and with a local businessman, Jimmy, who whilst having no interest in carnivorous plants, had a knowledge of them. The first day in Singapore was spent trying to get in contact with these people. First off I caught a taxi down to Jimmy's office. Instead of ending up there, I ended up at an Indian Department Store in a slum section of town quite some miles away. Upon arriving at Jimmy's office I was to learn that he had troubles in one of his mines and had to fly up to Malaysia to deal with them but hoped to be back very soon. Going down to the Botanic Gardens I met one of the botanists there who was very helpful. I arranged to go back to the Gardens to photograph their plants. The plants were kept in a bush house which was out of the way somewhat and heavily barred and locked. Here the three Nepenthes varieties that were here were grown to what in my mind had to be perfection: so robust, green and covered with large pitchers. Going back to the office, we then had a discussion regarding the Nepenthes and here are the main points of what she had to say. In Singapore there are three varieties of Nepenthes: ampullaria, gracilis, and rafflesiana. However, it is the official policy of the Singapore government to rid the island of Nepenthes, this a result of a ruling by the Ministry of the Environment that they were a potential breeding ground for mosquitos although she said to her knowledge she knew of no mosquitos or their larvae in Singapore that were immune to their digestive juices. They enforce this ruling by spraying them thoroughly or physically clearing them completely. But nevertheless, there are still some to be found, particularly in water catchment areas and along cliffs facing the sea on the west coast, particularly on the island of Sentosa. They are found in the secondary jungle. Here they grow in lateritic clays. The cliff faces are pretty dry and the catchments are boggy. The temperature in Singapore remains fairly constant at 70-75°F. and so does the humidity at 90-95%. The rainfall is from 70-80" per year with an even distribution slightly favoring the end of the year. At the gardens the Nepenthes are grown in a mixture of burnt clay, leaf mold and organic manure. They are fertilized once a fortnight with a small amount of nalotin and are watered twice daily. They have propagated them by striking cuttings in moist sand but have made no attempt at growing them from seed. She has been collecting on Mount Kinabalu which apparently is "THE" place to go for Nepenthes. Having read books which tell of Malaya's Nepenthes, which have been known to consume birds and rodents, I asked her about this. She said the largest thing she had come across in a pitcher was a small lizard, but there was a large range of insects. The only other thing she had to say was that the pitchers had a deeper mottling in the shade. At the end of our discussion she was kind enough to ask if I would like to see them out in the jungle, so she arranged for the garden's chief specimen collector to take me out the next day.

I turned up the next morning armed to the teeth with camera equipment and film. It looked stormy and by the time to leave we were in the middle of a tropical downpour which lasted for half of the day. But as opportunity never knocks twice, I decided to press on.

To my surprise, this secondary jungle was only about fifteen minutes out from the Botanic Gardens. Here the soil was yellow clay with up to 6" of leaves covering it. It was quite heavily shaded, the ground was moist but not visibly marshy although the town reservoir was only 300 yards away, so the water table was probably fairly high. Here the rafflesiana was relatively rare for we only came across three plants. Gracilis was most common. Ampullaria was squat while small--there was no evidence of the plant--just pitchers. The land around the walkways had been cleared of Nepenthes and my guide expressed amazement at the quantity that had disappeared. There was evidence of some small plants of gracilis coming up from seed in the cleared areas. I managed to take pictures of plants by using a flashlight, for in the jungle with the rain it was pitch black. The results were quite surprising. The biggest vine we saw was about 20' high. The biggest rafflesiana pitcher I saw was about 9" long, the smallest 4". There were three different types. The largest ampullaria was about 3", the smallest 1/2". The gracilis ranged from 1/4" to 6". The real excitement for the day came on our way out of the secondary jungle when we managed to get caught in the middle of an Army exercise. Four huge black Doberman pinschers came bounding up at us. Behind them came a group of Singapore soldiers, all carrying large black machine guns. Two of them were being dragged by two Dobermans which were on chains. As the dogs were about four or five feet from us, their masters yelled out to them in Chinese, or Malay, and they stopped dead in their tracks. We stopped in ours when we first saw and heard them. All I can say is thank goodness their trainers did not stutter; otherwise, I think we would have been in big trouble.

Next day, Jimmy rang me at the hotel to ask if he could come around and see me. He put himself at my disposal for the afternoon. As he was obviously a very successful businessman, I dressed accordingly to meet him with a great pile of clothes I had tailor made in Hong Kong, from my Spanish antelope coat to my calfskin shoes. We drove around the town visiting a number of shops. After this, he suggested we have a look at some Nepenthes. We drove to the back of the University--a construction site. Here we waded through thick greasy orange clay and pushed our way through rain-soaked scrub. Again gracilis proved to be the most common but no plant was more than 5" long. There were two plants of ampullaria but these were only small. The soil was gravelly orange clay and damp from seepage. The fate of the Nepenthes here was sealed, for this area was about to be absorbed into the University. The coloration of the gracilis varied from intense reds and oranges to greens. Sometimes the reds were in shaded areas, sometimes in the sun, and vice versa with the greens. For this I shall not try to offer any explanation. Jimmy informs me that two years ago rafflesiana grew here. Today they are all gone. He told of another round-leaved Nepenthes. With finding these in mind, we drove to another site about half a mile away near the top of an abandoned quarry. Here the soil was still developing. It consisted of ironstone and quartz. Gracilis again was the most common, the plants ranging from 1/2" diameter seedlings to 50' high vines covering the trees. The only seed pods for the whole trip were observed on four plants, about half a dozen--all seed had gone bar two lots. Only one plant of ampullaria was found here. It had a 1/2" diameter stalk with 12-18" leaves. The plant was 5' high with only one pitcher on the bottom leaf. This seemed strange for the plant looked to be a perfect specimen. Here the sunlight was more direct as there were not many shady trees. The size of the pitchers on the gracilis ranged from 1/8" to 12". We then went to a reserve to see a cliff face of Nepenthes but unfortunately the government beat us to it and the cliff was now a nice grassy one and all the Nepenthes were gone. These round-leaved Nepenthes and rafflesiana eluded us. On the last day of our stay in Singapore Jimmy came around again to see us and took us out for a last attempt to find the above. I do not know the name of the place we went, but we were successful in our quest. Here the soil appeared to be yellow clay, but on examination it was very much like sand. Again there was plenty of ironstone and white quartz. As per usual, gracilis was the most common. We found five plants of ampullaria. These overall appeared to prefer a soil with an A00-A0 horizon. We found one seedling about 6" in diameter of rafflesiana which grew under a small shrub where it was heavily shaded. Finally a cry came out of Jimmy--he had found it, the round-leaved Nepenthes. There were two small seedlings on a half buried stem. The pitchers appeared very similar to gracilis--they were red-orange in color. To pick a difference I would say perhaps they had more hairs on the alae of the pitchers which seemed more bulbous, but I would not say they were not a form of gracilis, although gracilis seedlings the same size seemed to have straight pointed leaves. Ampullaria seems to produce more pitchers when young. Upon driving back to the hotel, we were to learn that the land where we had been was soon to be used for high rise housing development.

Before leaving for the trip I had read Dr. P. A. Zahl's article on "Malaysia's Giant Flowers and Insect Trapping Plants" in the May, 1964 edition of National Geographic in which I saw the author quaffing the contents of a sanguinea pitcher. The idea appealed, but not being as adventurous as Dr. Zahl, I stuck to sealed pitchers. The ampullaria's contents were very viscous, mucus like, the taste very acid. It caused a slight burning sensation on the tongue but was not unpalatable. The gracilis was just

like ordinary water. The other two had no pitchers on them still sealed, and not being too adventurous, I resisted the temptation to sample these.

Since returning home, I have been told that actually five different Nepenthes grow in Singapore, the other two being two crosses - a Nepenthes hookeriana and another natural hybrid. Perhaps the round-leaved one was one of these. However, I wrote away inquiring about these two plants and managed to get in contact with the Garden's chief specimen collector, Mahmud. In his reply, he informed me: "There is a Nepenthes hookeriana not in Singapore but in Borneo and Malaysia." Unfortunately he makes no mention of the other one. Just who is right I do not know. Mahmud has been working for the Gardens for 27 years and is extremely knowledgeable about all types of plants. The botanist has an M.Sc. and at the time I was speaking to her she did not know of them. However, the existence of another two Nepenthes on Singapore comes from a paper written in the early 1960's on an analysis of Singapore's Nepenthes by Sally Green.

The Botanic Gardens at Singapore in an effort to increase its collection of carnivorous plants has expressed a willingness to swap the local Nepenthes for other carnivorous plants. If you would like to obtain plants or seed, write to: Miss S.Y.Geh, Botanic Gardens, Cluny Road, Singapore 10, Republic of Singapore.

FIELD OBSERVATION OF WINTERING UTRICULARIA VULGARIS
by A. Roger Kirby

While passing through northern Virginia on a recent trip to Maryland, I spotted several swampy areas that I felt needed a closer look for any CP's that might be there in winter bud. After marking the mileage from different points, I continued on, planning to stop on my way back.

Leaving Maryland on Monday morning, I drove into Virginia and proceeded to one of the areas I had marked by mileage. Upon arriving at the first bog I noticed the bog had little water in it for this time of year. I slipped on my hip boots, grabbed a five gallon bucket and walked into the shallow water and mud of the swamp. I immediately noticed Utricularia all over the bottom of the bog. I started gathering and putting them into the five gallon bucket. The plants were approximately twelve inches long, or six inches on each side of their "Y" form, and at the crown was the dark green whorled winter bud. I gathered the plants until I had the five gallon bucket about one-third to one-half full. I left the swamp for the car and I checked my watch and realized I had only taken twelve minutes to do all I did. I looked closer at the Utricularias and recognized them to be U. vulgaris because of the very large bladders, some 1/8" long in size, or 4-5 mm. x 2 mm. wide.

I had only covered a few square yards and due to the enormity of the swamp, it would take a full day to check it out more thoroughly for additional species of CP's.

I now plan to return in the spring to take a closer look when the plants are in bloom. I feel more Utricularia species are there and I also plan to take pictures. This seems a great place for CP enthusiasts, so I will let CPN know of my progress.

OBSERVATIONS OF TRICHOPTILUS PARVULUS AND DROSERA
by Grady Lucas

It seems that not all insects will succumb to the carnivorous nature of Drosera. One of these insects is the caterpillar of the moth Trichoptilus parvulus. This moth is a fairly small representative of the phylum pterophoridae, or "plume" moths.

Although many insects are known to be associated with Sarracenia and other carnivores, few are known to be associated with Drosera. There have been reports of a moth larva of the family Noctuidae which might feed on the plant, but these apparently crawl only on the glandless portions of the plant. Certain Australian Hemiptera of the family Capsidae are said to feed on the juices of arthropods caught by Drosera and are able to move about the leaves without any apparent difficulty.

After hatching from their eggs the larvae are no more than 1.5 mm. long, and their larval life will usually last about eight days.

Usually the first sign of Trichoptilus is that the leaves seem to have been chewed away, and pellets which look like fecal matter litter the surface of the leaves. The caterpillars apparently stay hidden under the sphagnum moss during the day and come out at night to feed.

The main food of the younger larvae seems to be the stalked gland itself, whereas the older larvae will not stop at just the stalk and will usually eat the leaf blade as well. They may also eat the remains of captured insects. It may take from 10-20 minutes for a